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Appliances

Woodburners

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Introduction

Our database of over 140 woodburners will help you find the right model for your needs.

Choosing the right woodburner depends on your house and whether you want a wetback. Getting the best performance from it will depend on the size and type of wood you burn.

Our database includes information on size, heat output, the predominant heating mode and options such as wetbacks and other special features.

Note: Models specifically designed for rural locations and not emissions-tested are *not* included.

Pros and cons

The large amount of radiant heat produced by woodburners suits many of our houses – especially older, poorly insulated and draughty homes with high ceilings. A properly sized and installed woodburner can heat the whole home.

Many people also like the toasty radiant heat a woodburner produces. Some models can heat hot water and all of them can be used during a power cut. Many have a flat top surface for heating a kettle – or even for emergency cooking.

Burning wood is carbon-neutral because it's a renewable resource, but burning it **cleanly** is the key to making it enviro-friendly.

By burning dry wood in a clean-burning woodburner you win 3 times over:

Wood is a sustainable heating fuel.

You get more heat from a clean-burning (non-smoky) fire.

Cleaner burning means fewer smoke particles lodging in all our lungs.

That’s the positive stuff. The flip side of woodburners is their contribution to air pollution and their relative lack of convenience.

If you burn wood carelessly or burn wet wood you can create a health hazard through ultra-fine pollution lodging in people's lungs. Modern woodburners can burn much more cleanly than older models. But our tests have shown that clean burning only occurs if the fire is carefully tended – and with the right-sized dry wood.

Air pollution is not inconsequential. The ultra-fine soot particles in wood smoke are a health hazard. They can lodge deep in the lungs causing premature death, hospitalisation and respiratory illness. It’s not just the people of Christchurch and Nelson who are at risk: there are many areas (“airsheds”) where there are health risks from wood-fire pollution.

Woodburners aren’t as convenient as heat pumps or central heating systems. You “regulate” the room temperature through the amount of wood you burn and there’s no timer-controlled automatic starting system. You also have to buy firewood in advance and store it.

Emissions and efficiency

If your land area is less than 2 hectares, any woodburner you install must comply with the National Environmental Standards (NES). The NES sets limits for emissions (how much of the firewood ends up as solid particulates in the atmosphere) and efficiency (what percentage of the wood’s heat energy ends up in the room).

The emissions figure is the number of grams of smoke particles for every kilogram of dry wood burnt. The NES requires that this be less than 1.5g/kg. If you live in Canterbury or Nelson the rules are even tougher.

The efficiency figure is the percentage of the theoretical maximum heat contained in the firewood that the burner delivers to the room. The NES requires this to be 65 percent or greater for woodburners in urban areas.

Compliance testing

All new woodburners must be tested for compliance with the NES - and this must be done by an approved laboratory. The manufacturer sends a sample model to the lab, which notes the critical dimensions of the model and tests its burner's efficiency and emissions.

If a model passes the tests, it's NES compliant. The manufacturer then labels all production of that model as such.

However, several tests – including our own – have shown the emissions figures obtained in the lab can be exceeded many times over when the woodburner is installed in a house and is burning real firewood.

That means NES-compliant woodburners are still probably significant polluters. It also means regional authorities may have poor information when trying to assess the pollution impact of the woodburners installed in an “airshed” in their area.

Check your local air quality

Regional councils monitor air quality every day and most put the data on their websites. The following cities and towns have monitoring data *live* on their regional council websites:

Tauranga, Rotorua, Whakatane, Te Kuiti, Tokoroa, Taupo, Hamilton, Putaruru, Reefton, Rangiora, Kaiapoi, Christchurch, Ashburton, Timaru, Waimate, Geraldine, Alexandra, Clyde, Cromwell, Arrowtown, Ranfurly, Central Dunedin, Mosgiel, Milton, Invercargill, and Gore.

New test method

The test method used for NES testing describes in detail how a woodburner is to be tested. During the test no adjustments are allowed to the burner controls. This means, for instance, a burner that automatically adjusts its airflow to minimise emissions during the burn cycle cannot be allowed. As well, the test doesn’t include the start-up period – when there’s often the most pollution.

Once the testing is completed, the internal design of the burner isn’t allowed to be changed. So it’s illegal to retro-fit any device to the burner, or its flue, that might improve performance.

The upshot is that the NES test which was meant to improve the cleanliness of woodburners has stifled design innovation. We’re aware of several technological developments that have been “caught” by the rules and so haven’t been implemented.

New deal

What’s the answer? There’s a new Canterbury Method (CM1) being developed. It’s sponsored by Environment Canterbury (ECAN). This CM1 standard won’t replace the existing NES – but because it’s more stringent, local authorities will be able to choose to use it.

The new method has been developed in response to the needs of people rebuilding houses after the Christchurch earthquakes. It will allow CM1-approved woodburners to be installed in areas where woodburners have been banned for new houses.

The new method takes a different approach from the NES: it specifies the desired emissions and efficiency but not *how* to achieve them. It also tries to mirror how people *actually* use their woodburner. So it has a full-burn test cycle that measures a woodburner’s performance through light-up, warm-up, burn, refuel and die-down.

The new method issues a challenge – as far as we know no currently available woodburner could pass this test – but industry insiders believe it is achievable. We look forward to some innovative and clean-burning products.

Wetbacks

Woodburners for urban areas have to comply with National Environmental Standards (NES), which means they must have a minimum "space-heating efficiency" of 65 percent. (See Emissions and efficiency for more about the National Environmental Standards for woodburners.)

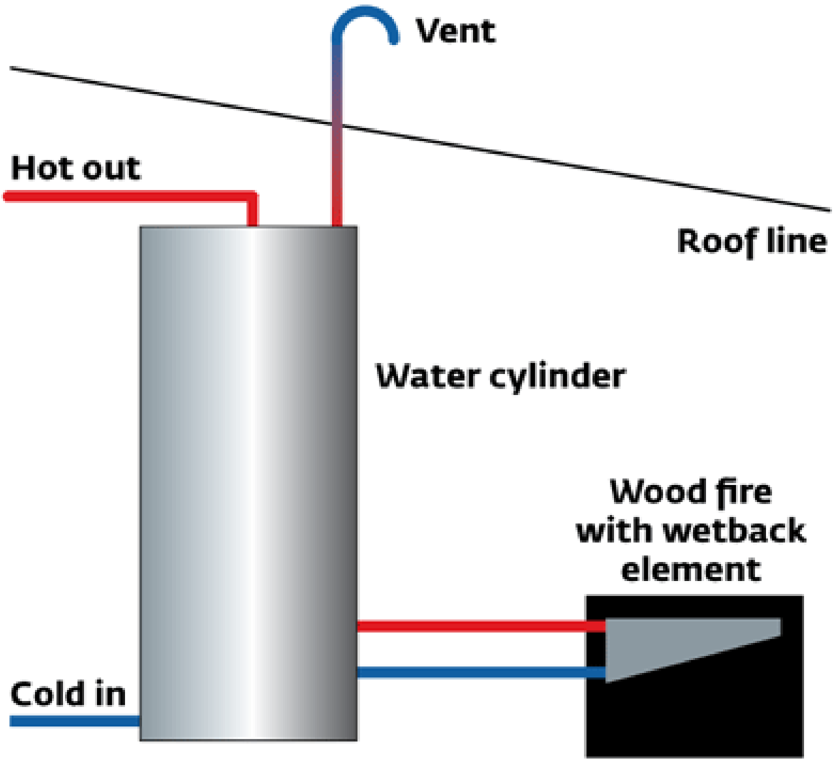
"Space-heating efficiency" is the efficiency of converting the wood's heat energy into space (air) heat. The water heating from the wetback isn't included in the efficiency calculation – so when some of the wood's energy is going into water heating it means that relatively less is going into space heating.

This means that some woodburners are compliant without a wetback but *not* compliant when fitted with one. This is because the heat removed by the wetback reduces the woodburner's efficiency to below 65 percent.

One problem with woodburners is they can over-heat the lounge while the rest of the house remains cold. This isn't healthy. The most common commercially available heat transfer systems use ducting to move warm air. We think the rule on wetback "efficiency" is holding back development of woodburner systems that could distribute heat around the house using a wetback and water radiators.

Tip: If your house is not open plan, think seriously about installing a heat-transfer system.

Wetbacks are expensive to install and require the hot water cylinder to be placed reasonably close to the burner. The payback period for a wetback depends on how you use your woodburner. If the woodburner is not used every day, a wetback is unlikely to be cost effective.



Heat output

The amount of heat a woodburner produces depends on the type and quantity of wood, how big and dry the pieces are, and how often the fire is refuelled.

This means it's trickier to state a definitive heat output for woodburners than for other types of heater, because different testing methods will give different heat outputs – even for the same woodburner.

To be sold in urban areas, all woodburners *must* be tested for emissions and efficiency to the **AS/NZS 4012/4013 test method**. This involves running the woodburner until it has a glowing ember bed. Then a precise amount of kiln-dried and knot-free pine is placed into the firebox; and the heat output is measured until the wood burns down to an ember bed again.

We these results for scoring the heat output of the woodburners in our database because it gives a consistent and repeatable result for comparing models. But it understates what you could achieve in your home – perhaps by 30 percent or more.

For some models, our database also shows the results of the **New Zealand Home Heating Association (NZHHA)** test method. This refuels the woodburner every 20 minutes, so the heat output will be higher. These results reflect the maximum you could achieve in your home.

Tip: Keep the woodburner refuelled often and use dry firewood of the right size (110mm diameter or less). Control the heat output by adjusting the amount of wood that's burning rather than by using the air control.

How woodburners work

It's a two-stage process. First, if the wood is hot enough, the combustible creosotes and resins will evaporate out of the timber and will be burnt as gases (if these gases are not burnt completely the result is smoke).

The evaporation of the gases turns the wood to charcoal, which then burns easily and cleanly - and produces most of the heat.

To burn as cleanly as possible, the fire needs to be as hot as possible. It also needs the right amount of air to support the combustion. Too much air cools the fire and smoke is produced. Not enough air has the same effect.

Modern woodburners burn efficiently because the firebox is lined with firebrick material, making a hotter fire. The combustion air is carefully admitted to give the most complete combustion possible. The resulting efficiency (conversion of the fuel energy into heat in the room) is around 65 percent.

Contrast this to the traditional open fire, which admits far too much air, cooling the fire and giving an efficiency of 15 to 20 percent. Some even have negative efficiency – they draw cool air into the house, warm it and send it up the chimney!

Checklist

If you're about to buy a woodburner, here's what to consider.

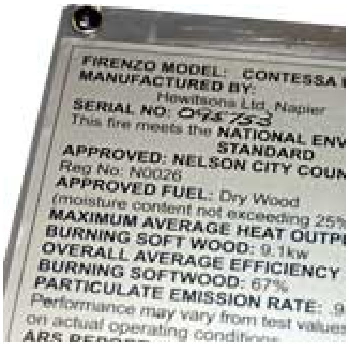
Type

Freestanding models are generally the most efficient (for a given firewood load, they return the most heat to a room). They're also the cheapest to install. But if you have an existing open fireplace, an insert model is most often the way to go. Although insert models are not as efficient as freestanders, they're way better than an open fire.

Heat output

Choose a woodburner with a heat output suitable for your home. If you have a non-draughty well-insulated home in the north of the North Island then 10kW should be plenty. A larger house – or the same-sized but less-well-insulated and draughty house – further south will require more heat output. Think in terms of 12-14kW.

In non-open-plan houses there's no point in overheating the lounge while the rest of the house stays cold. Install a heat-distribution system to help spread the heat throughout the house.



FIRENZO MODEL: CONTESSA
MANUFACTURED BY:
Hewitsons Ltd, Napier
SERIAL NO: 095753
This fire meets the NATIONAL ENV
STANDARD
APPROVED: NELSON CITY COUN
Reg No: N0026
APPROVED FUEL: Dry Wood
(moisture content not exceeding 25%
MAXIMUM AVERAGE HEAT OUTP
BURNING SOFT WOOD: 9.1kw
OVERALL AVERAGE EFFICIENCY
BURNING SOFTWOOD: 67%
PARTICULATE EMISSION RATE: .9
Performance may vary from test values
on actual operating conditions

Be careful about manufacturers' heat-output claims – some grossly exaggerate what you'll get. Always check the compliance plate (pictured). This has to be on every woodburner that's sold – and it states the **tested** heat output, along with the efficiency and emissions rate. See Heat output for more information.

Convector vs radiant

All woodburners both heat the air *and* radiate heat on to objects that are within a few metres of them. But some woodburners are marketed as predominantly one type or the other. It depends on the external design of the firebox.

> A **convector** heater heats the air immediately around it. Hot air is lighter (less dense) – so it rises away from the heater and gets replaced with cooler air which is in turn heated. This convection air-current means that the warmest air in the room ends up near the ceiling with the coolest air near the floor. Convector heaters are air warmers.
>
> A **radiant** heater “shines” heat on to anything in its path. That could be you if you’re near the fire, or furniture within a few metres of the fire.

Tip: Convectors are best for well-insulated non-draughty houses with low ceilings. Radiant-type models suit older and less-well insulated (or draughty) houses with higher ceilings.

Controls/cleaning

The controls should operate smoothly, and it should be relatively easy to clean the outer surfaces and empty the firebox.

Flue system

The flue must have a larger diameter outer shield around it where it passes through the ceiling and attic space. Some of the newer designs have this air-gap vented outside rather than into the room (outside venting stops hot air escaping from the room). Some other woodburners get the air needed to burn the wood from outside the house rather than from within the room: this improves efficiency and reduces drafts.

Emissions

The lower the particulate emissions from your fire, the less of a health hazard you'll be causing. You can find this out from the woodburner's compliance plate. See Emissions and efficiency for more information about emissions.

Wetbacks

A wetback uses copper pipes to circulate water from the woodburner to the hot-water cylinder and back. They're expensive to install and the hot water cylinder needs to be placed reasonably close to the burner. The payback period for a wetback depends on how you use your woodburner: if the woodburner's not used every day, a wetback is unlikely to be cost effective. See our section on wetbacks for more information about this type of woodburner.

Safety guards

Woodburner surfaces can get very hot and can be a danger to small children. Protective guards are available, and highly recommended.

Building consent

Before you buy a woodburner, make sure your local authority will allow you to install the model you want: some councils will only allow installation of models from their recommended list. You will also need to get a building consent before you install your woodburner (you're unlikely to get one retrospectively). If an illegally installed wood-burner causes a fire, it may invalidate your insurance cover.

Installation

A poor installation job can ruin the heating and emissions performance of the best of woodburners. Check that your installer has New Zealand Home Heating Association certification or is otherwise suitably experienced.

Heat transfer

A heat-transfer kit usually removes warm air from the lounge and ducts it to a colder part of the house. Alternatively it can be set up to duct cold air from elsewhere in the house and deliver it to the lounge for heating. Either way the doors must be left open or ajar so that the air can circulate and even out the temperatures.

Firewood

Woodburner design is an important part of low emissions from burning wood – but so is the wood itself.

Firewood must be seasoned (less than 25 percent moisture content) and must also be the right size (fits through a 110mm hole) to burn with maximum efficiency and minimum pollution. That means buying firewood several months (hardwood dries more slowly than softwood) ahead of winter and storing it (where air can circulate but it’s sheltered from the weather) … or paying more for dry firewood.

The Nelson City Council is running a “GOOD WOOD” scheme of preferred firewood suppliers. These suppliers only sell seasoned firewood in winter – and they sell unseasoned wood only if there’s enough time for it to dry before winter. A similar scheme is being set up in Canterbury.

You can buy inexpensive ($25 or less) moisture meters on www.trademe.co.nz and www.aliexpress.com. These meters let you check the moisture content of firewood you are about to buy or burn.

See our Firewood survey for more information about buying and storing firewood.

Our advice

- Don't buy a woodburner without making sure it complies with the emission rules and that your local council will allow it to be installed.
- Make sure you get a building consent *before* you install your woodburner.
- Insulate your home as much as possible. Better-insulated homes require less heating.
- If your home isn't open plan, install a heat-transfer system.
- Install a wetback (but only if the installation costs aren't too high).
- Buy the cleanest-burning woodburner that suits your needs.
- Burn only dry seasoned wood – and make sure it's less than 11cm in diameter.
- Don't buy a woodburner with a higher heat output than you need – you'll waste fuel and overheat your home.

More information

Ministry for the Environment's list of authorised woodburners: www.mfe.govt.nz

Environment Canterbury authorised woodburners: www.ecan.govt.nz

Nelson City Council authorised woodburners: www.nelsoncitycouncil.co.nz

NZ Home Heating Association www.nzhha.co.nz

Report by Bill Whitley.